

REMARKS/ARGUMENTS

Favorable consideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-10 are pending in the application, with Claims 1-4 and 6 amended by the present amendment.

In the outstanding Office Action, the title was objected to; Claims 3 and 6 were objected to; Claims 1-8 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Egawa (JP 2000-224492 A) in view of Merrill (U.S. Patent No. 5,892,541); and Claim 9 was indicated as containing allowable subject matter.

Applicants gratefully acknowledge the indication of the allowable subject matter.

Claims 1-4 and 6 are amended to more clearly describe and distinctly claim Applicants' inventions and to correct the informalities noted in the Official Action. Support for these amendments is found in Applicants' originally filed specification. No new matter is added.

Briefly recapitulating, amended Claim 1 is directed to solid state imaging device. The solid state imaging device includes an imaging region including unit cells arranged in a matrix of rows and columns to provide a plurality of pixel rows. Each of the unit cells have photoelectric conversion means for photoelectrically converting incident light, applied to pixels, to store signal charges, readout means for reading out stored signal charges to a detection node, and amplifying means for amplifying the readout signal. The solid state imaging device also includes a readout voltage switching circuit configured to set a readout driving signal, applied to the readout means, to one of a plurality of voltages different to one another according to internal control. The readout voltage switching circuit is also configured to set a voltage of the readout driving signal, corresponding to the readout pulse for a dynamic range increase, to a lower voltage than a voltage of a readout driving signal

corresponding to a usual readout pulse. The solid state imaging device also includes a pulse production circuit including a vertical shift resistor configured to sequentially generate pulses for a dynamic range control, based on an external input pulse for the dynamic range control.

The claimed inventions provide improved dynamic range performance.¹

Egawa discloses a solid state imaging device, including cells arranged in a matrix.²

As shown in Figure 1, the solid state imaging device includes: a) an image pick-up area (photo-electric-conversion section) 14 in which pixel cells are arranged in a shape of a matrix; b) vertical signal lines VLIN formed in a pixel column direction of the image pick-up area 14; c) readout vertical selection lines 6 which are formed in a pixel row direction of the image pick-up area 14, and which cause a photo-electric conversion signal of each pixel cell 13 to be read out by the vertical signal lines VLIN in units of pixel rows; d) a first vertical selection circuit (readout shift resistor) 2a which performs a selection control in a scanning operation, of the readout vertical selection lines 6 at the timing when the readout operation is performed; e) a second vertical selection circuit (vertical shift resistor for electronic shutters) 15a which performs a selection control in a scanning operation, of the readout vertical selection lines 6 at the timing when the signals are stored; f) a vertical-drive circuit (pulse selector) 16 which generates a driving signal for selectively driving the readout vertical selection lines 6 based on an output of the first vertical selection circuit 2a and an output of the second vertical selection circuit 15a; g) a horizontal selection transistor TH which selects the vertical signal line VLIN; h) a horizontal selection circuit (horizontal selection shift resistor) 3 which executes a selection control of the horizontal selection transistor TH; i) a level signal line HLIN which reads signals of the vertical signal line VLIN, selected by the horizontal selection shift resistor 3; and j) an output amplifying circuit AMP which outputs the signals read out by the horizontal signal line HLIN.

¹ Specification, page 13, lines 4-24.

² Egawa, abstract.

However as noted in the Official Action, Egawa fails to disclose or suggest Applicants' claimed "read out voltage switching circuit configured to set a readout driving signal, applied to the readout means, to one a plurality of voltages different to one another according to an internal control." Applicants submit that Egawa also fails to disclose or suggest Applicants' claimed "readout voltage switching circuit configured ... to set a voltage of said readout driving signal, corresponding to said readout pulse for a dynamic range increase, to a lower voltage than a voltage of a readout driving signal corresponding to a usual readout pulse." Egawa also fails to disclose or suggest Applicants' claimed "pulse production circuit including a vertical shift resistor for sequentially generating pulses for a dynamic range control, based on an external input pulse for said dynamic range control."

Merrill describes a system and method for increasing the dynamic range of an imaging system 100 that uses an array of active pixel sensor cells 110 arranged in rows and columns by: (i) detecting the voltage of each cell 110 using a detection circuit DCm; (ii) resetting each cell 110 according to the detection result; (iii) storing data on the number of times a reset operation has been executed, in a unit 112; and (iv) reading out the stored data.³ However, like Egawa, Merrill fails to disclose or suggest Applicants' claimed "pulse production circuit including a vertical shift resistor for sequentially generating pulses for a dynamic range control, based on an external input pulse for said dynamic range control."

As none of the cited prior art, individually or in combination, disclose or suggest all the elements of independent Claim 1, Applicants submit the inventions defined by Claim 1, and all claims depending therefrom, are not rendered obvious by the asserted prior art for at least the reasons stated above.⁴ For substantially similar reasons, Applicants submit that Claim 4, and all claims depending therefrom, also patentably define over the cited references.

³ Merrill, Figures 2-3.

⁴ MPEP § 2142 "...the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of

Accordingly, in view of the present amendment and in light of the previous discussion, Applicants respectfully submit that the present application is in condition for allowance and respectfully request an early and favorable action to that effect.

Respectfully submitted,

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success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."